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| APPLICATION NO.   | FILING DATE   | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO.            |  |
|---|---------------|----------------------|---------------------|-----------------------------|--|
| 10/551,516  | 09/28/2005    | Greg A. Whyatt       | 2370766-04          | 6020                        |  |
| 32215   | 7590          | 11/23/2009           |                     |                             |  |
| KLARQUIST SPARKMAN, LLP<br>121 SW SALMON STREET, SUITE 1600<br>ONE WORLD TRADE CENTER<br>PORTLAND, OR 97204 |               |                      |                     | EXAMINER<br>HANDAL, KAITY V |  |
| ART UNIT<br>1795  |               | PAPER NUMBER         |                     |                             |  |
| NOTIFICATION DATE   | DELIVERY MODE |                      |                     |                             |  |
| 11/23/2009  | ELECTRONIC    |                      |                     |                             |  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

tanya.harding@klarquist.com  
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erin.vaughn@klarquist.com

|                              |                                      |                                      |
|------------------------------|--------------------------------------|--------------------------------------|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/551,516 | <b>Applicant(s)</b><br>WHYATT ET AL. |
|                              | <b>Examiner</b><br>KAITY V. HANDAL   | <b>Art Unit</b><br>1795              |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 29 July 2009.  
 2a) This action is FINAL.      2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 18-21, 24-26 and 54-59 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 18-21 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

|  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/1648)<br>Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 18-19 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bowe et al. (US 2003/0105172 A1).

With respect to claim 18, Bowe teaches a steam reformer (Fig. 3, 30) operable to produce hydrogen from steam and hydrocarbons (as illustrated); and a vaporizer (31) for supplying the steam to the steam reformer (as illustrated); wherein the steam reformer (Figures 1 & 4 & 6) comprises a panel (Fig. 4, stack of plates 42) defining a first face (see Fig. 6 also) where a panel (the entire stack of plates (62) and corrugated foil (64)) defining a first face (the illustrated left face) comprising one or more channel inlets/tubes (68), and a second face (face opposite the first – not illustrated) comprising one or more channel outlets (68) (page 4, paragraph [0047]), though Bowe does not provide details as to which side is the inlet or the outlet of the channel/tube (68), it is understood that one face would be the inlet side and the opposite face would be the outlet side. Bowe et al. further teaches wherein the panel has a length and width for each face, and wherein the face width is substantially greater than the distance between the faces (as illustrated in Figure 6),

as follows: the distance between the two faces is basically the width of the rectangular plates (62) which is equal to 50 mm (page 4, paragraph [0046]). The width of the face equals 100 mm (which equals the length of the rectangular plates (62)). Though length of the face in Bowe et al. is not substantially greater than the distance between the two faces, the length of the face is dependent on the number of plates (62) and corrugated foil (64) layers in the apparatus; the height of each plate is 1 mm plus height of the corrugated foil equals 4 mm. Though the figure illustrates 10 corrugated foil layers and 11 plates yielding a panel face of 51 mm which is greater than the distance between the two faces of 50 mm, but not substantially greater; one skilled in the art can choose the number of plates and corrugated layers to integrate in the apparatus based on factors such as the reactor cost of construction and efficiency of operation which are variable(s) that can be modified, among others, by changing the number of plates and corrugated layers to integrate, with said construction cost and operating efficiency both optimized as the number of plates and corrugated layers are optimized, the exact number of plates and corrugated layers to integrate would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed face length (or height) cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the number of plates and corrugated layers to integrate into the apparatus of Bowe et al. to obtain the desired balance between the construction cost and the operation

efficiency (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

Process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation (i.e. heating in heating channels) are of no significance in determining patentability of the apparatus claim."

Though Bowe fails to teach explicitly having a fuel cell, it would have been obvious if not inherent to one having ordinary skill in the art at the time of the invention that the hydrogen generated by the steam reformer of Bowe et al. can be supplied to a fuel cell for power generation, which is widely known in the art and evidenced by Whyatt et al. (Abstract, lines 1-5 in cited literature titled "Progress on the Development of a Microchannel Steam Reformer for Automotive Applications").

With respect to claim 19, Bowe teaches a multiplicity of reformer heating channels (Fig. 4, 44) from the first face to the second face of the steam reformer (as illustrated) wherein the smallest dimension of the heating channels is less than about 0.05 inch/(0.30 mm = 0.0118 inches) (page 4, paragraph [0044], lines 1-7).

3. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bowe et al. (US 2003/0105172 A1), as applied to claim 19, in view of Shimazu et al. (US 2001/0049906 A1).

With respect to claim 20, Bowe discloses all claim limitations as set forth above including having the vaporizer (31) being downstream of the reformer (30), but fails to teach further details on the vaporizer wherein the vaporizer is a panel defining a first face and a second face having a multiplicity of vaporizer heating channels therethrough. Shimazu teaches a vaporizer (Fig. 1, 32) downstream of a steam reformer (30) wherein the vaporizer (Fig. 24) is a panel (172) defining a first face and a second face having a multiplicity of vaporizer heating channels there-through (as illustrated) (page 5, paragraph [0071]) in order to vaporize any unvaporized or precipitated water with greater speed in the bottom region of the reformed gas channels (page 5, paragraph [0072]).

It would have been obvious to one having ordinary skill in the art at the time of the invention to replace the vaporizer of Bowe with that of Shimazu in order to vaporize any unvaporized or precipitated water with greater speed in the bottom region of the reformed gas channels.

With respect to claim 21, Shimazu further teaches a variable speed blower means (Fig. 1, 26).

### Response to Arguments

4. Objection made to the specification is withdrawn by Examiner due to applicant's amendment made to the specification.
5. Applicant's arguments filed 7/29/2009 have been fully considered but they are not persuasive.
6. On page 7 of the Remarks, 2<sup>nd</sup> paragraph, applicant argues the following:

With regard to FIG. 6, Bowe discloses a conventional reactor 60 having gas mixture flow channels formed by corrugated foils 64 and stacked rectangular plates 62. Bowe explains that each of the stacked rectangular plates 62 is 100 mm long and 50 mm wide. *Id.*, ¶ [0046]. It is understood that the "transverse slots" defined by the foils 64 extend the length of the plate 62, i.e., 100 ram, and that a length or a width of an inlet to the "transverse slots" measures 50 ram. Thus, FIG. 6 cannot be relied upon to teach or suggest a reformer wherein the length *and width* of each face is substantially greater than the distance between the faces, as recited by claim 18.

Bowe et al. illustrates in Figure 6 a panel (the entire stack of plates (62) and corrugated foil (64)) defining a first face (the illustrated left face) comprising one or more channel inlets/(tubes (68)), and a second face (face opposite the first – not illustrated) comprising one or more channel outlets (68) (page 4, paragraph [0047]), though Bowe does not provide details as to which side is the inlet or the outlet of the channel/tube (68), it is understood that one face would be the inlet side and the opposite face would be the outlet. Bowe et al. further teaches wherein the panel has a length and width for each face, and wherein the face width is substantially greater than the distance between the faces (as illustrated in Figure 6), as follows: the distance between the two faces is basically the width of the rectangular plates (62) which is equal to 50 mm (page 4, paragraph [0046]). The width of the face equals 100 mm (which equals the length of the rectangular plates (62)) is substantially

greater than the distance between the two faces. Though the length of the face in Bowe et al. is not substantially greater than the distance between the two faces, the length of the face is dependent on the number of plates (62) and corrugated foil (64) layers in the apparatus; the height of each plate is 1 mm plus height of the corrugated foil equals 4 mm. Though the figure illustrates 10 corrugated foil layers and 11 plates yielding a panel face of 51 mm which is greater than the distance between the two faces of 50 mm, but not substantially greater; one skilled in the art can choose the number of plates and corrugated layers to integrate in the apparatus based on factors such as the reactor cost of construction and efficiency of operation which are variable(s) that can be modified, among others, by changing the number of plates and corrugated layers to integrate, with said construction cost and operating efficiency both optimized as the number of plates and corrugated layers are optimized, the exact number of plates and corrugated layers to integrate would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed face length (or height) cannot be considered critical.

Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the number of plates and corrugated layers to integrate into the apparatus of Bowe et al. to obtain the desired balance between the construction cost and the operation efficiency (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general

conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

Process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation (i.e. heating in heating channels) are of no significance in determining patentability of the apparatus claim."

7. On page 7 of the Remarks, 4<sup>th</sup> paragraph, applicant argues the following:

Moreover, the apparent taking of Official Notice concerning the fuel cell on page 3 of the outstanding Office action is improper. It is well-settled that Official Notice is only appropriate without citing a prior art reference where the facts asserted to be well known are capable of instant and unquestionable demonstration as being well-known.

Examiner respectfully disagrees that "Official Notice" was taken in the last Office Action. However, in order to eliminate any further issues, Whyatt et al. was relied upon to demonstrate that it is indeed well known in the art that reformed hydrocarbon can be fed into a fuel cell, as set forth above.

8. On page 7 of the Remarks, applicant argues that there was a mischaracterization of the Bowe et al. prior art because the smallest dimension of the heating channels of less than about 0.05 inches as related to claim 19. Applicant states that Bowe's disclosed thickness of the sheets measures 0.3 mm. Examiner respectfully explains that it was rather a typographical error and not a mischaracterization of the prior art. The last Office Action, under the rejection of claim 19, the limitation of "less than about 0.05 inch was followed by "(0.03 mm = 0.0118 inches)", the typographical error was

corrected in the rejection set forth above to include "0.05 inch/(0.30 mm = 0.0118 inches)". It is noted that 0.0118 inch is less than about 0.05 inch.

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAITY V. HANDAL whose telephone number is (571)272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. V. H./  
Examiner, Art Unit 1795

11/10/09

/Jennifer K. Michener/  
Supervisory Patent Examiner, Art Unit 1795

## Search Notes



**Application/Control No.**

10/551,516

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**Examiner**

KAITY V. HANDAL

**Applicant(s)/Patent under Reexamination**

WHYATT ET AL.

SEARCHED

**SEARCHED**

## INTERFERENCE SEARCHED

| Class | Subclass | Date | Examiner |
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**SEARCH NOTES  
(INCLUDING SEARCH STRATEGY)**